7
The Environmental Dimension: Analysis

7.1 Since the publication of the 1985 *Vulnerability* report, new concepts and approaches to economic development have become widely accepted as essential to conserve the environment as the common heritage of humankind. The 1987 report of the Brundtland Commission, *Our Common Future*, advanced a definition of sustainable development as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs'. This has been interpreted in practice as a commitment to a path of social and economic development which does not expose future generations to unacceptable risks, and that places considerable emphasis on improving the well-being of the poorest sections of society. Both aspects have pervasive implications for the development strategies of small states.

7.2 The 1992 UN Conference on the Environment and Development (UNCED), held at Rio de Janeiro, approved Agenda 21, which set out a comprehensive programme to achieve sustainable development worldwide. Chapter 17 addressed the special problems of SIDS, noting the combination of factors giving rise to vulnerability: small size, isolation from major markets, ecological fragility, geographic dispersion and limited resources. The 1994 UN Global Conference in Barbados adopted a specific Programme of Action to address these problems.

7.3 This chapter and the following address two elements of the environmental agenda for small states. The first is the issue of vulnerability. It examines the major risks to which small states are exposed and which can lead, in terms of our earlier discussion of threat, to a situation in which the quality of life of the inhabitants of a state is drastically degraded by a single act or event or a sequence of acts or events. The second theme is the adjustments that small states will need to make to their strategies and instruments for economic development if they are to achieve sustainable development.

Environmental Vulnerability

7.4 The environmental risks to which states are exposed can be divided into external and internal risks. The dividing line is not hard and fast, but the essence of the distinction is that external risks are 'imposed'

by forces and events outside the state in question, while internal risks are generated within the state. The distinction does not rest on the degree of control over the risk: both external and internal risks may be open to control and mitigation by the state.

External Risks

Natural disasters

7.5 In 1990 the United Nations Disaster Relief Organisation (UNDRO) produced a report on the economic impact of disasters for 195 countries over the previous twenty years. Of the 25 most disaster prone countries, 13 were small island states. Some lost, in some years, between 28% and 1200% of their GNP. Several studies completed since then confirm that small states are likely to suffer disproportionately from natural disasters.

7.6 In 1995, Briguglio published a study using the data collected by UNDRO confirming that island states tend to suffer more in terms of per capita damage from natural disasters and damage per unit area than non-island states. In turn, small islands suffer more than large islands. The higher incidence of natural disaster on small island states tends to reflect their risk proneness and this in turn is a function of geographical location. Smallness also means that a given event, a volcanic eruption, is likely to have a highly concentrated level of damage, so that, in proportionate terms, more damage is done.

7.7 The Briguglio study is open to criticism. A number of island states are not in fact prone to hurricane or volcanic disaster. Countries with a zero score, i.e. zero risk, in the UNDRO list include Anguilla, The Bahamas, Barbados, Bermuda, Kiribati, Maldives, Reunion, Seychelles, Trinidad and Tobago, New Caledonia and Tuvalu (although the last two named have recently experienced cyclones). Nonetheless, if the UNDRO index is accepted it does suggest that small states are particularly prone to disasters. Taking the 'total' index (the total damage caused by disasters over 20 years divided by annual GNP), small states occupy five of the 'top ten' disaster prone countries, whilst on the 'average' index (total damage divided by the number of events to get a 'per event' damage indicator), small states comprise no less than eight of the top ten places.

7.8 A separate exercise, using the database of the Centre for Research on the Epidemiology of Disasters, which estimates the probability of a fatality, or of being affected significantly, by disasters also points out the risks in small states. While the data are imperfect, they suggest a lower risk of fatality from disasters in small states – about half that of

the risk in large states – but a significantly higher risk of being affected by a disaster – about twice the risk in large states. This contrast arises partly because of the generally limited land area in small states, so that single disasters are likely to affect a greater proportion of the population. The lower death rate in small states perhaps suggests a greater state of preparedness in small states where disaster events are often familiar. A further complicating factor, however, is that the definition of disasters used in the database in question appears to include some civil conflicts. These can often raise numbers of deaths without necessarily affecting the whole population.

Vulnerability to sea-level rise

7.9 There is growing scientific evidence that human activity has begun to change the average temperature of the Earth's surface. These temperature changes have been brought about by the emissions of various 'greenhouse gases', most notably carbon dioxide from the burning of fossil fuels and from the burning of tropical forests, and methane, also from fossil fuel use and certain agricultural activities. The Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) declares that 'the balance of evidence suggests that there is now a discernible human influence on climate' and 'the signal is just beginning to emerge from the noise of natural variability', but 'there are still uncertainties in key factors'. The global mean surface temperature of the Earth is expected to rise by 2°C by 2100 with a confidence interval of 1°C to 3.5°C. Nor will warming stop in 2100 even if the concentrations of greenhouse gases in the atmosphere are stabilised: there are substantial time lags in climate change. Warming now is due to emissions of greenhouse gases in the past, the gases staying in the atmosphere for sometimes considerable periods before decaying. It is important to understand that the 2°C change is an average. There will be significant regional variations with some parts of the world experiencing less warming and some more.

7.10 One of the consequences of temperature change will be sea-level rise, mainly due to the thermal expansion of the oceans – the increase in the volume of water brought about by a temperature increase. The mean rise is projected by IPCC to be 50 cms by 2100, with a range of 15 to 95 cms. Other effects of global warming may be just as significant, notably the expected increase in the variability of weather: more storms and hurricanes, stronger monsoons, and so on.

7.11 Sea-level rise is of particular concern to small states as over half the countries classified as small states are islands. But, being an island is not the critical factor in terms of vulnerability to sea-level rise.

Many large countries have extensive coastlines that would be just as vulnerable, particularly when there are large population areas near the coast. However, the problem is especially acute for many small states as most populations, agricultural lands and infrastructures of SIDS exist in the coastal zone and for many the effect will also be felt on the marine environment with possible damage to coral reefs and to fisheries. There is also the danger of inundation of outlying islands and damage to vegetation and freshwater resources through saline intrusion.

7.12 The disproportionate risks small states face is set out in Table 7.1. This reproduces the survey in Turner et al (1996), but dividing countries into small and large states, and adding some new information. Crude averages offer some insights into the differential impacts. The survey did not include the two Commonwealth small states expected to be most affected by sea-level rise, namely Maldives and Tuvalu.

7.13 First, a far greater proportion of the population of small states suffers from the potential effects of sea-level rise than in large states, 66% against 9%. Notable are Kiribati and the Marshall Islands for having 100% of their populations 'at risk'. Absolute numbers are relevant in devising policies. In the 11 large states for which information is available, some 185 million people are estimated to be at risk from a one metre sea-level rise. In the seven small states for which data are available, the affected population is 800,000. Of course, one metre sea-level rise is not the final effect of unchecked global warming: sea-levels would continue to rise in the absence of effective policies.

7.14 Second, a similar picture is revealed for land area lost. Small states lose 1.6% of total land area while large states lose one half of this amount. If the USA is excluded from large states the percentages are much closer at 1.6% and 1.3% respectively. In absolute terms, the sample of eight small states lose just over 4,000 km^2, whilst the large states lose over 150,000 km^2, more than 35 times as much.

7.15 Third, capital value losses as a percentage of GNP are very large in Guyana and the Marshall Islands, with only one other small country having data showing this value. Losses in large states show a wide range with an upper bound of 200% in Egypt. Averages are not meaningful in this context but the general picture is one of capital losses being probably no worse in small states than in large ones.

7.16 Fourth, adaptation costs, defined as the costs of protection for all areas other than low population density areas, show a marked difference, although the sample for small states is small (five observations). It appears however that small states may face adaptation costs of some 2% of GNP per annum, with wide variation, compared to just 0.1% for

large states. Turner *et al* (1996) suggest that large rich states already have sea protection systems in place that will cost modest amounts to improve (relative to GNP) whereas small states do not have such systems in place. The idea that the richer OECD states face less proportionate costs appears to be only partially borne out in Table 7.1. If Poland is included as a developed state, the average cost is 0.05% of GNP, but the example of Japan shows that costs can be very high even for rich countries.

Table 7.1 Impacts of One Metre Sea-Level Rise

Country	Population Affected (%)	Capital Value Loss as % GNP	Land Area Lost (%)	Wetland Loss km²	Adaptation Costs as % of GNP p.a.
Small States:					
Antigua	50	n/a	0.4	3	0.32
Belize	35	n/a	8.4	n/a	n/a
Guyana	80	1.115	1.1	500	0.26
Kiribati	100	8	12.5	n/a	0.10
Marshall Islands	100	324	80.0	n/a	7.00+
Mauritius	1	n/a	0.5	n/a	n/a
St Kitts and Nevis	n/a	n/a	1.4	1	2.65
Tonga	47	n/a	2.9	n/a	n/a
Big States:					
Argentina	n/a	6	0.1	1,100	0.02+
Bangladesh	60	5	17.5	5,800	0.06
Benin	25	12	0.2	85	0.41+
China	7	n/a	n/a	n/a	n/a
Egypt	9	204	1.0	n/a	0.45
India	1	n/a	0.4	n/a	n/a
Japan	15	72	0.5	n/a	0.12+
Malaysia	n/a	n/a	2.1	6,000	n/a
Netherlands	67	69	5.9	642	0.05
Nigeria	4	52	2.0	16,000	0.04+
Poland	1	24	0.5	36	0.02
Senegal	>1	14	3.1	6,000	0.21+
Uruguay	<1	26	0.1	23	0.12+
USA	n/a	n/a	0.3	17,000	0.03+
Venezuela	<1	1	0.6	5,600	0.03
Average					
Small States	66[1]	-	1.62[2]	-	2.0
Big States	9[1]	-	0.77[2]	-	0.1

The full list of studies on which these estimates are based is given in bijlsma (1996).

Notes: (1) numbers of affected people/total population
(2) land area lost/land area

Source: Turner *et al* (1996) and consultant's calculations.

Vulnerability to extreme events

7.17 The second feature of climate change is likely to be increased frequencies of serious weather 'events'. Already some 45,000 people die every year in extreme events, mostly cyclones. Because cyclones can only form over hot sea surface temperatures they tend to be confined to certain areas, with particular risks to the small states of the South West Pacific and the Caribbean. Given a doubling of carbon dioxide concentrations, one estimate suggests there could be 8,000 additional deaths in the world from cyclones, and perhaps an additional US$ 630 million of damage. No detailed breakdown appears to be available to identify the extent to which small states would share in this projected incremental loss. Some caution is necessary in accepting these figures, particularly when a recent study on cyclones in the South Pacific reports no statistically significant increase in tropical cyclones between 1969 and 1994.

Marine pollution

7.18 The intensified use of oceans and seas as a resource for food, mining, energy generation, water, transportation, recreation and tourism have increased the importance of the marine environment and highlighted the need to control marine pollution. Oceans and seas have long been used as a 'sink' for waste disposal which can be either land-based (affecting mainly the immediate coastline through run-off and outfalls) or sea-based (through dumping or the passage of ships). While the former is the main source of contamination and pollution, marine transportation and the dumping of waste at sea account for nearly a quarter of pollutants entering the marine environment. These can take a number of forms ranging from potentially extremely hazardous items such as radioactive and toxic waste disposal to unsightly garbage and sewage disposal from passenger and cargo ships. Oil pollution is a significant problem for many states and can cause severe localised environmental damage.

7.19 In recognition of these problems a regional seas programme has been developed by the UN Environmental Programme which covers the Caribbean, the Mediterranean and the South Pacific. However, in all these areas considerable risks remain and in some instances these are growing risks. The increase in cargo and tanker traffic as a result of globalisation and of cruise ship tourism are two examples. A cruise ship with a complement of 1,200 passengers and crew will generate 4,200 kg of garbage per day exclusive of other pollutants such as oily wastes, residues and sewage. In the Caribbean, in the early 1990s there were on average 120 ships operating this trade while The

Bahamas alone received 108 visits per month. Ports in the region do not on the whole have the facilities to deal with the levels of waste generated by these and other shipping activities. Additionally, fears have been expressed that developing countries have been targeted by industrial nations as a dumping ground for hazardous waste and more generally that shipments of hazardous waste continue across their EEZs.

Internal Risks

7.20 Internal risks arise from the natural resource endowment of the nation state, the demands made on those resources, the human resources available, and the size of the market. Smallness seems likely to give rise to disproportionate risks since the availability of substantial resources is less likely, small populations limit available labour and entrepreneurship, and small populations similarly limit market size, thus preventing gains from economies of scale. In practice, the picture is more complex than this. Resource endowments are the result of a combination of features including land area, the chance of fortunate location, and climate. There need be no necessary correlation between population size and resource endowment. The examples of Namibia and Botswana show that natural resource richness can be accompanied by small populations.

7.21 Similar qualifications surround the concept of carrying capacity. In principle, any land or sea area has a limited carrying capacity, defined as the maximum number of people that can be sustained indefinitely with a given resource base. Traditionally, carrying capacity has been measured in terms of food availability, but other resource constraints may be binding, and indeed they may actually limit the level of population even before food constraints do. Obvious and relevant resources in the small size context are fuel supplies and water. Less obvious resources include the capacity of marine ecosystems, especially coral reefs, to sustain tourist activity. There is likely therefore to be a maximum number of tourists that can be sustained from given amounts of natural resources and amenity.

7.22 While the carrying capacity notion is attractive, it is important to understand its limitations. First, resource constraints are often capable of being relaxed through investment. The binding constraint might, for example, be summertime low level flow in a river. But that is capable of being relaxed through the construction of storage capacity which enables low flow augmentation. Second, the limits set by carrying capacity as far as any country or region is concerned can be relaxed through trade with other areas. A fuelwood deficiency might be reduced by importing fuelwood in exchange for something else. This

avenue for relaxing the constraint, however, may not always be open and water is an obvious example of a commodity that is usually not traded in this way. Third, carrying capacity may change over time as demands on resources are reduced, perhaps through migration, and as the productivity of the resource base rises, perhaps through technological change. Nonetheless, investigating carrying capacity can be the source of helpful information.

7.23 This section examines some major examples of resource destruction and stress on carrying capacity – deforestation, desertification, freshwater provision, commercial fishing and tourism – which are directly relevant to small states.

Deforestation

7.24 Although the pressures for utilising indigenous resources in small states are likely to be high, there is little evidence to suggest that rates of forest conversion are any higher in small states than in large ones. Compared to the early 1980s, few small states show significant reductions in forest cover. Over 80% of the land area of the Solomon Islands is classified as forest and woodland, and there was just over 3% reduction of cover in the early 1990s compared to the early 1980s. Mauritius reveals the most dramatic deforestation rate for a small state, at 24% over the decade. Forest cover is now around 25% of the total land area of 200,000 hectares.

7.25 Typically, deforestation arises from a complex mixture of factors. Two dominant ones are rapid population change, either in terms of natural expansion or in terms of migration, and what might be termed 'economic failure'. Economic failure refers to the inability of economic systems to register the right market signals to capture the true economic value of environmental assets. For example, a forest has many ecological functions and these are also economic functions. They include the provision of timber and non-timber forest products (rattan, rubber, fruits, nuts etc.), the function of storing biological diversity, the protection of watersheds (such that deforestation often gives rise to flooding, river sedimentation etc.), and the storage of carbon which, if released through forest burning becomes the greenhouse gas carbon dioxide. Many of these functions have limited markets and some have no evident market at all. Thus, there is no obvious market in the carbon storage function, and no easy way in which those who benefit from watershed protection can pay forest owners or dwellers to conserve that function.

7.26 These 'missing' or 'incomplete' markets do much to explain why forest resources are undervalued relative to the alternative use of forest land, e.g. for agriculture and livestock. The choice of land use thus

becomes biased in favour of so-called 'developmental' uses of forest land and against conservation and sustainable uses. Allied to this form of economic failure is another, sometimes called 'intervention failure' or 'government failure' whereby governments intervene in the workings of the economic system, often with very good motives, but to the detriment of forest cover. Many countries, for example, have subsidised forest clearance, a conspicuous example being Brazil in the 1970s and 1980s. Others fail to tax forest concessions at a reasonable rate, inflating the profits that forest concessionaires can achieve from clear cutting. Most pervasively, property rights in forest land are often poorly defined. This opens the way for new entrants to take land over, often to the detriment of indigenous peoples who may have traditional but unregistered rights to the land. Effectively, the forest becomes an 'open access' resource, not owned by anyone and abused by all. In other cases, open access becomes an invitation to claim the land regardless of any traditional rights that might prevail.

Desertification and soil erosion

7.27 There are a number of causes of desertification. They include overgrazing, overcultivation, woodland destruction and poor irrigation practices. These lead to an acceleration of processes already common in drylands such as soil erosion, resulting in significant environmental stress and reduced carrying capacity.

7.28 The small states most affected are in Southern Africa. They suffer moderate desertification defined as 25% or less loss in cropland productivity and livestock carrying capacity in rangelands. Pressures are severest in Lesotho where population growth and and an acute shortage of cultivable land has led to cultivation of former grazing land and unsuitable steep mountain slopes, leading to severe soil erosion. Poor pastoral practices have also added to the problem which has been further compounded in recent years by an above average incidence of drought. Botswana and Namibia also have major problems of soil degradation and overgrazing which have led to calls for better management of the important livestock industry in both countries.

Water

7.29 One measure of resource scarcity based on water availability is a simple water stress index which measures the per capita water availability for agriculture, industry and domestic use. The benchmark is 1,000 cubic metres per person per annum: below this level suggests that there will be problems. On this criterion six small countries are currently at risk – Bahrain, Barbados, Cape Verde, Djibouti, Malta and

Qatar. Some of the water stress states may well have both the technology and the financial resources to extract fresh water from sea water. Malta, for example, already does this on a significant scale.

Fishing

7.30 There is a global problem of overfishing. Current levels of harvesting of conventional marine resources are at or above levels which can be sustained. The pressures on fish stocks for food is increasing, reflecting both population growth in the developing world and higher demand for fish products. The rising real price of fish, along with the overcapacity of fishing fleets maintained by subsidy, are creating strong incentives to fish, leading to economic pressures on countries to limit the scope of national measures and international agreements to manage stocks sustainably. The Food and Agriculture Organisation (FAO) estimate that about 25% of the fish stocks for which data are available are overfished or depleted and that a further 44% are already either heavily or fully fished and at risk of being overfished.

7.31 The global statistics mainly reflect what is occurring within waters under national sovereignty and the problems of fisheries management are faced largely at this level. However, for many SIDS, it is also important to focus on regional and international management, particularly of straddling and highly migratory stocks which regularly cross EEZs and the high seas. Since the mid-1980s, an extra million tonnes of annual tuna catch has come mostly from the Western Central Pacific and Western Indian Ocean. The world catch of squids has also grown, with the coast of West Africa being a prime fishing location. The income that can be earned from licencing foreign vessels to access fish resources can be very significant and account, as in the South Pacific, for a substantial proportion of government revenue. There is therefore every reason to ensure effective regional management as established in the Forum Fisheries Agency and more recently internationally in the 1995 UN Agreement on the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks. The latter is particularly significant since it is the first time the precautionary approach has been applied in a high seas fisheries agreement.

Tourism

7.32 Small states figure prominently among nations that are heavily dependent upon tourism as a source of private and public revenues. Among the states where over 50% of export earnings come from tourism are Antigua and Barbuda, The Bahamas, Barbados, Maldives, St Kitts and Nevis, and St Lucia. To this can be added those who

secure 20-49% of their export earnings this way: Belize, Cyprus, Dominica, The Gambia, Grenada, Jamaica, Malta, Samoa, Seychelles, and St Vincent and the Grenadines. Studies confirm that smaller states tend to have higher dependency on foreign tourism, and that there is an inverse statistical relationship between tourism receipts as a percentage of GNP and the population size of the country in question. This high dependency on a single source of revenue brings its own macroeconomic problems, but it also has a critical environmental dimension. If the number of tourists exceeds the carrying capacity for tourists, then the quality of the resource that sustains the tourist industry will itself decline. This will tend to deter repeat visitors and even potential first time visitors if they get to hear of the change in environmental quality.

7.33 Measuring tourist carrying capacity is notoriously difficult. One study suggests that small countries (defined as less than five million people) tend to experience a higher intensity of tourist demand per square kilometre, which in turn serves as an indicator for environmental demand. In small countries the demand amounted to 71 persons/km^2, just under ten in medium sized countries (5-30 million population) and just under one person/km^2 in large countries. Another study calculates that Bermuda had 142 visitors per km^2 in the daytime in 1990, compared to 18 for The Bahamas. The Cayman Islands had 17 persons/km^2 whilst some of the South Pacific islands (Fiji, New Caledonia, Samoa, Solomon Islands,Tonga and Vanuatu) had less, and sometimes substantially less, than one visitor/km^2. Even these numbers are difficult to interpret. Apart from the fact that different sources quote different numbers, congestion and environmental impacts may not be determined by the relationship between visitors and total land area, but between visitors and areas zoned for tourism. Some islands, for example, do not experience significant inland demand for tourism, whereas coastal zones can be heavily in demand.

7.34 Perhaps more important than numbers per km^2 is the fact that the relevant ecosystems are themselves very fragile. This is especially true of coral reefs. The other major determinant of environmental damage is land conversion for tourist resorts and/or tourist related economic activity. Land conversion for tourism has probably not been a significant factor in deforestation, since the demand for tourist land is primarily coastal resort based. But there is some evidence of wetlands being drained to create resorts. Studies of tourist behaviour suggest that they are very sensitive to the appearance of resorts in terms of both the general landscape and disamenity of beaches, and to the pollution of bathing waters. It has been suggested that falls in tourist numbers after 1987 in The Bahamas, Barbados, British Virgin Islands, US Virgin

Islands, French Polynesia and Bermuda may have been due to the effects of exceeding some generalised notion of carrying capacity, but the change in demand has not been subject to any analysis of the various factors that might explain it.

Ecological Fragility

7.35 One aspect of vulnerability to which much attention has been drawn in small island states is ecological fragility. Small islands act as habitats for species which are distant from alternative populations of the same species, and there is a high degree of species endemism. The introduction of other species threaten indigenous species which often lack the ability to compete with them and which therefore puts them at risk of extinction. The openness of modern economies means that this endemism is always at risk, and, indeed, islands have tended to be the focus of many of the recent species losses. There can also be economic consequences since many SIDS are developing ecotourism ventures exploiting the uniqueness of their species and habitats.

Vulnerability and Sustainability

7.36 The principal focus of this chapter is on vulnerability. But, as indicated in Chapter 2, vulnerability is also determined by the ability to withstand stress and shocks. The capacity to adapt and to be resilient can do much to lessen vulnerability even if not much can be done to reduce the incidence of risk. Actions taken by government are important here. While these must necessarily be specific to the risk or threat, the discussion at the beginning of this chapter introduced the idea of sustainable development. This links the environment and the economy together providing the frame-work within which specific action is taken. In assessing the vulnerability of a state, sustainability is an essential goal. An economy or ecosystem can be thought of as being sustainable if it possesses the capacity and capability to develop in a continuous fashion without the prospects for the future being threatened by the factors that give rise to the stress. In this way, the future well-being of a population is partly dependent on the resilience of the system, and that resilience depends in turn on certain features of the economic system. In the literature on sustainable development these features tend to be expressed in terms of the capital assets of the nation and their diversity. It is worth exploring, therefore, if small states have more or less of these 'sustainability features' than large states.

Sustainability indicators

7.37 To realise sustainable development any strategy of economic and social development should not seek to maximise gains for this generation

if in so doing it reduces the capacity of future generations to provide for their own wants and needs. The capacity to meet needs depends on the stock of assets available to each generation. Call these assets 'capital'. Then the capacity of future generations to meet their needs will definitely be compromised if they have less of these assets than are available to the current generation. It follows that each generation should leave for the next generation a stock of capital assets no less than the stock it has available. This has come to be known as a 'constant capital rule', but a moment's reflection suggests that keeping the stock of capital assets will not be enough. Most countries have rising populations, and this is especially true in the developing world. Constant assets would therefore mean a smaller stock of assets per capita if population is rising. The rule needs reformulating to mean constant per capita capital stocks, and, of course, if future generations are to be better off than current generations, that rule should be further modified to mean at least constant capital, and ideally rising capital stocks. On this rule, population increase clearly makes the chances of achieving sustainable development less than if population is constant.

7.38 Offsetting this concern to some extent is the fact that capital can be made more productive in the sense that future generations should be able to secure more output and services from their capital stocks than the current generation does today. This is because capital tends to improve in efficiency over time, and the source of this increased efficiency is technical change. In turn, technical change comes about because of improved technologies and improvements in the management of technology. This immediately highlights the role of improvements in education, skills and the transfer of technology to small states.

Capital stocks

7.39 For sustainable development, then, we need constant or rising per capita stocks of capital assets, and, as a rough rule of thumb, we also require that the rate of technological change should at least offset, and ideally be greater than, the rate of population growth. But what is meant by 'capital'? It is very important to understand capital in its broadest sense. Traditionally, capital referred to man-made assets such as machines, roads, factories, houses, vehicles, and so on. As early as 1960, however, economists had begun to recognise that education was important in explaining economic development, so that the definition of capital was expanded to include human capital. It is only in the last decade that proper recognition has similarly been afforded to the environment as a source of economic development.

7.40 Environmental capital, or 'natural capital', comprises the full array of environmental assets, from oil and gas in the ground, to

forests, the stocks of ground water and river water, the quality of the air, the quality and quantity of soil, and so on. At the global level these stocks include the atmosphere and its temperature regulating activities, the ozone layer and its role in regulating ultraviolet radiation, the various biogeochemical cycles that regulate hydrological and nutrient flows, and which provide the very life support systems on which we all depend.

7.41 Today, there is also interest in the final constituent of the capital concept – social capital. Social capital is what holds society together, what gives it cohesiveness. Without social capital, social regulation breaks down and one can expect more crime, public disorder, family breakdown, drug abuse etc. This is a new area of investigation and little can be said in specific terms about the role of social capital in the development process. However, we have earlier identified cohesiveness as an important characteristic of many small states and anything which can be done to improve it is a factor contributing to resilience and reducing vulnerability.

7.42 The constant capital rule requires that the total stock of capital per capita – man-made, human, and natural – be at least constant through time. Efforts to measure this total stock have only just begun. A World Bank study in 1995 provides some preliminary estimates. The most important observation on small states is that they are neither among the richest nor the poorest states in the world. Only two (Suriname and The Bahamas) have a per capita wealth above US$ 200,000 compared to 26 large states and only ten (among them The Gambia, Kiribati, Maldives and Samoa) have a per capita wealth less than US$ 25,000 compared to 70 large states. Most small states have per capita wealth in the range US$ 25,000 to US$ 199,999.

7.43 It must be emphasised that such estimates are not especially reliable since they are based on inadequate data and have only been collected for one year. They should therefore be regarded with considerable caution. As far as small states are concerned, the implications are mixed. In so far as most of them are middling states they are unlikely to be targeted by external donors funding poverty reduction programmes designed to achieve sustainable development. On the other hand, the environmental risks to which small states are exposed, especially SIDS, would appear to suggest higher margins of per capita wealth are needed if they are to seriously reduce vulnerabilities across the board. Equally, the above average per capita income levels enjoyed by many SIDS provide an important cushion for coping with the impact of natural disasters and the wide fluctuations of national income which trouble many of them.